

MATERNAL ANXIETY AND THE CHILD'S
BEHAVIOR IN THE DENTAL CHAIR

by

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INTRODUCTION

A child's behavior during dental treatment has perplexed dentists, psychologists, researchers, and parents for many decades. For some dentists, treating children has become a terrorizing thought. These providers would probably say that the behavior of a child is completely unpredictable and extremely difficult to control. However, many others have dedicated their professional lives to studying the behavior of children and things that affect it. Many professionals have chosen to provide dental treatment for children and have taken it upon themselves to try to make these experiences for the children as friendly, enjoyable, and nonthreatening as possible. Numerous factors can influence a child's behavior in the dental chair, and these can then affect the experience that the child will have in the dental office.

A significant amount of research has been done to determine variables that contribute to a child's behavior in the dental chair. Nainer studied the time trends between 1969 and 1998 that show an increase in the number of publications listed under pharmacologic behavior management, compared with the decrease in the publications concerning child behavior and nonpharmacologic management.¹ Ollendick and King found that the majority of children attribute their fears to instructional/informational and vicarious/indirect factors, which are often combined with direct conditioning experiences.² Holst, Schroder, and coworkers found three non-dental variables and four dental variables that have predictive power in determining whether a child will have behavioral concerns.³

A significant amount of research shows a correlation between maternal anxiety and a child's behavior in the dental chair. For example, Shoben and Boreland found that the attitude of the patients' families is a significant etiologic factor of dental fears.⁴ Muris, Steereman, Merckelbach, and Meesters found a positive correlation between the fearfulness of the child and that of the mother, and that the correlation varies as a function of the expression of fearfulness by the mother.⁵ Corkey and Freeman found that the mother's fear of dental treatment has an influence on the child's dental anxiety.⁶ Research has also shown the opposite, that no correlation exists between maternal anxiety and a child's behavior in the dental chair. Klorman, Ratner, Arata, King, and Sveen found that measures of the mother's anxiety, in terms of state, trait, or specific dental anxiety, have no association with the dentist's assessment of the child's behavior.⁷ Klorman, Michael, Hilpert, and Sveen state that there was no significant relation between the uncooperativeness of the child and his mother's anxiety.⁸ Folayan, Adekoya-Sofowora, Otuyemi, and Ufomata also found no statistically significant relation between the anxiety level of the mother or the father and that of the child.⁹

As shown here, there has been much research done to determine what influences a child's behavior in the dental chair. However, a large controversy concerning the mother's anxiety about dental treatment and a child's behavior in the dental chair has appeared throughout the decades. The purpose of this study is to determine if there is a correlation between maternal anxiety and a child's behavior in the dental chair.

REVIEW OF LITERATURE

There has been a significant amount of research done to determine variables that contribute to a child's behavior in the dental chair. Nainar studied the various areas of research interest in the pediatric dental literature over a 30-year period, from 1969 to 1998. The time trends show an increase in health services research and pharmacologic behavior management. The trends show a decrease in research in child behavior and nonpharmacologic behavior management, dental trauma, growth and development and orthodontics, pulp therapy and medicaments, and fluoride. There is an increase in the number of publications listed under pharmacologic behavior management compared with the decrease in publications concerning child behavior and nonpharmacologic behavior management.¹

Dental anxiety, which often leads to behavior management problems, may be dealt with in different ways. Several different behavior management techniques are used. Doring estimated that at least 10 percent of all children who present for dental treatment are not manageable by using standard behavior techniques, which may include tell-show-do, positive reinforcement, voice control, and modeling.¹⁰ Behavior management problems are more common in younger children, among children who miss appointments, and among children who receive restorative treatment without local anesthetics.¹¹ Hallmarks of effective communicative-management techniques include honesty, flexibility, confidence, appropriate vocabulary, setting expectations, and the ability to listen and interpret a child's feedback. Other methods of behavior management

include visual imaging, hypnosis, modeling, and preconditioning appointments.¹²

Regarding the origins of dental anxiety, Chambers stated that a mother is anxious when her child is anxious, and that when a mother accompanies a child into the operatory, such an action sustains the presence of an anxiety model.¹³ Locker, Liddell, Dempster, and Shapiro have found that out of 1420 randomly selected subjects that answered two mail surveys, 16.4 percent reported dental anxiety. The study was to examine the age of onset of dental anxiety and to study the differences of onset with respect to potential etiologic factors. Childhood dental anxiety was reported by 50.9 percent of subjects, and a family history of dental anxiety was predictive of childhood onset anxiety only, not of adult onset anxiety. Regardless of age of onset, negative dental experience is predictive of dental anxiety. This indicates that subjects with child-onset of dental fear are more likely to have exogenous, etiological dental anxiety, such as a family history of dental anxiety or a previous negative dental experience.¹⁴

Personality traits of patients with extreme dental anxiety have been studied by Schuurs, Duivenvoorden, Makkes, Thoden van Velzen, and Verhage. They looked at 103 patients with extreme dental anxiety to determine the relation between personality traits and severe dental anxiety and concluded that more anxious patients are more neurotic and unstable. They described these neurotic and unstable patients as less decisive, more uncertain with their control, have a lower self-esteem, and are less inclined to act.¹⁵

Quinonez, Santos, Boyar, and Cross studied the temperament and trait anxiety of child behavior prior to dental surgery under general anesthesia. During pre-separation, temperament, moderated by age, gender, and interpersonal factors, predicts the children's

distress and disruptive behaviors.¹⁶

Bergdahl and Bergdahl studied the temperament and character personality dimensions in six men and 31 women with severe dental anxiety using the Dental Anxiety Scale (DAS) and the Temperament and Character Inventory (TCI). Novelty-seeking people and the female gender had high scores on the Dental Anxiety Scale, as well as a higher temperament dimension. These patients also scored lower on cooperativeness and higher on self-transcendence than the controls. Overall, neurotic extraverts (people who experience brief periods of magical thinking and are novelty seekers) are more vulnerable to developing dental anxiety.¹⁷

Foloyan, Idehen, and Ufomata administered a short-form dental subscale of the Child Fear Survey schedule to 81 patients from eight to 13 years of age. They found no significant association between age, socio-economic status, and the level of dental anxiety. However, they did find a statistically significant relation between the type of school the child attended and the anxiety level.¹⁸

Dental anxiety can have an effect on the dental health of the patient, due to the irregular dental visits that these patients tend to have. Alberth, Nemes, Torok, Makay, and Math found that the oral status of patients is influenced by various factors, including dental anxiety. Dentally anxious patients tend to have more missing teeth and fewer filled ones. This is seen in both older and younger generations.¹⁹

There are several studies that show a positive correlation between maternal anxiety and a child's behavior in the dental chair. Johnson and Baldwin found a significant relation between the level of anxiety in mothers, as measured by the Taylor Manifest Anxiety Scale, and the behavior of their children, according to the behavior

rating scale. The children that demonstrated significantly more negative behavior had mothers with high anxiety scores.^{20,21} Wright and Alpern found a positive relation between maternal anxiety and the child's negative dental behavior when studying children between the ages of three and six years of age.²² Wright, Alpern, and Leake also found a positive correlation between maternal anxiety and the cooperativeness of preschool children in the dental chair.²³ The behavior of a child in the dental chair is largely influenced by the family environment. Past medical visits, dental experiences of friends and family, anxiety about something being wrong with one's teeth, and the preparation at home for the dental appointment, are some of the variables that contribute to a child's behavior.²⁴

Parental presence in the operatory during dental treatment was studied to determine if such presence had an effect on the behavior of the child. Frankl and coworkers concluded that the presence of the mother acting as a passive observer in the operatory secures a more manageable patient, especially when the patient is less than five years of age. They also found that a mother who is properly instructed can be helpful in establishing a rapport between her child and the dentist.²⁵ Venham, Bengston, and Cipes found that the parents' presence is not associated with a more negative behavior from the children. Most parents and children prefer to stay together during the dental visits, at first, although this number decreases as the dental visits progress.²⁶

There are various factors that influence dental anxiety in patients. Stouthard, Rijkse, and van den Berg found that traumatic dental experience, persons in the direct environment, psychological background, and personal and professional traits of the dentist all play an important role.²⁷

Holst, Schroder, and coworkers studied 101 children in both the control group and the study group between the ages of three and 16. The study group consisted of patients referred to pediatric dental clinics because of behavior problems. The parents of the children were interviewed about their background variables. The authors found three non-dental variables and four dental variables that have predictive power in determining whether a child will be a behavior management problem. The non-dental variables include problems with visiting a physician, dental fear in the mother or father, and anxiety when meeting unfamiliar people. The dental variables include the child's earlier problems in seeing a dentist, dislike of the dentist, fear of injection, and insufficient time to adjust to the dental situation.³ A subsequent study found two other variables that had predictive value were the parent's expectation of a negative reaction from the child in the dental situation, and the child's anxiety when meeting unfamiliar people. Maturity, personality, and environmental factors all contribute to the child's behavior.²⁸

Corkey and Freeman, in a preliminary study of 60 six-year-old patients randomly selected from a school population, found that an interaction exists in which the mother plays a central role in influencing the degree of the child's psychological development and the child's ability to cope with the dental treatment. They also found that the mother's fear of dental treatment has an influence on a child's dental anxiety.⁶

Rantavuori, Zerman, Ferro, and Lahti studied children's first dental visits and their dental anxiety. They found that parental anxiety is associated with a child's dental anxiety. They also found that a problematic first visit is associated with dental anxiety, but that the anxiety can be modified with subsequent dental visits.²⁹

Colares and Richman found that factors associated with uncooperative behavior in Brazilian preschool children include the child's age, the parent's education level, the child's learning and behavioral problems, the parent's anxiety, the child's oral health status, general health status, history of hospitalization, and dental history.³⁰

Arnrup, Berggren, Broberg, Lundin, and Hakeberg found that parents of uncooperative dental patients have significantly lower socio-economic status and a higher level of dental anxiety compared with parents of cooperative dental patients. The parents of uncooperative patients also have poorer dental knowledge and a different responsibility-taking profile. The uncooperative children also have sweets more often than the cooperative children.³¹

Ollendick and King found that the majority of children attribute their fears to instructional/informational and vicarious/indirect factors, which are often combined with direct conditioning experiences.² Varpio and Well found that the background variables in causing dental fear in children referred to a pedodontic clinic include social factors, personality factors, and previous negative experience, in that order.³² Eli, Uziel, Baht, and Kleinhauz studied the previous circumstances that may result in dental anxiety and determined that the level of a subject's anxiety is affected by the evaluation of the present dentist and the memories of dental anxiety from childhood, as well as the personality traits of the patient.³³ Rice and Liddell studied a group of university students and similarly found that the attribution of positive attitudes towards dentistry centers largely on the dentist's personal characteristics and behavior. But, the dentist's level of responsibility was not clearly stated as a reason for patients having a positive or negative attitude toward dentistry.³⁴ Hakeberg, Hagglin, Berggren, and Carlsson studied the

correlations of general anxiety, dental anxiety, and mood. Both general anxiety and mood has a positive relation with dental anxiety, although the mood factor has significantly more impact on the dental anxiety of a patient than general anxiety. However, they also found that a major portion of variance for dental anxiety has unexplained variables.³⁵ Klaassen, Veerkamp, Aartman, and Hoogstraten found that daily anxiety-provoking situations in three-year-old children can cause dental anxiety at three and four years of age.³⁶

Winer stated that child dental fear is not a specific fear or phobia, but instead is a reflection of a child's more general fear level.³⁷ Klingberg, Berggren, and Noren stated that children with dental fear problems differ from those presenting with dental behavior management problems. Fearful children can be silent and shy in their contact with the dentist, and behavior management problem patients are more outgoing in their general behavior and are often rebellious during dental treatment. Only a minority of behavior management problem patients are dentally fearful.³⁸

Bush, Malamed, Sheras, and Greenbaum determined that the mother and child's behaviors tend to influence the child's ability to cope with the medical experience. Lower child distress and increased pro-social behaviors were associated with maternal use of distraction and low rates of ignoring.³⁹

Webster-Stratton and Hammond found no significant differences in home observations of children's behavior between those who have depressed or non-depressed mothers. However, the depressed mothers rated their children as having significantly greater problems than non-depressed mothers.⁴⁰ However, Sanger, MacLean, and Slyke found a significant correlation between maternal psychological distress and ratings of

children's behavior problems. They also discovered that children that were rated as having greater behavioral difficulties had mothers who reported having more anxiety, depression, and loss of behavior/emotional control.⁴¹

Shoben and Boreland found that the attitude of the patients' families is a significant etiologic factor of dental fears.⁴ Gershen concluded that perhaps more time should be spent trying to eliminate the mother's dental fears, so that she can become a vital force for generating the child's positive attitude toward the dental experience.⁴²

Venham et al. found that unsatisfied and insecure mothers more often had children who posed management problems. They also found that a child's cooperative ability is also influenced by a mother's child-rearing methods and the child's personality.⁴³

Although many variables have been found to contribute to children's dental fear, children who have a guardian with a moderate to high dental fear are twice as likely to be afraid of the dentist than children who have a guardian with low dental fear.⁴⁴ This is consistent with Feigal, stating that understanding the importance of parent-dentist communication is important in today's dental practice. Parents are not likely to turn over all decision-making to the dentist.⁴⁵ Muris, Steereman, Merckelbach, and Meesters found that there is a positive correlation between the fearfulness of the child and the fearfulness of the mother. They also found that the level of fearfulness of the child varied as a function of the expression of the fearfulness of the mother.⁵

There has also been some research concerning the characteristics of the children that would cause them to have more dental fear. Williams, Murray, Lund, Harkiss, and de Franco studied the differences between children who refused dental treatment and control children in a community. The children that refused dental treatment are rated by

their parents as being generally more negative in mood and not as comfortable playing with unfamiliar children. These children are associated with a general fear of “medical people,” a difficulty in adapting to change, and intolerance to pain or discomfort.⁴⁶

Klingberg and Broberg studied 124 Swedish children between the ages of five and seven and 10 to 12 years of age to determine the relation between dental fear and temperament. Temperament was assessed using the Emotionality, Activity, Sociability, (EAS) Temperamental Survey. The Dental Subscale of Children’s Fear Survey Schedule (CFSS-DS) and the Children’s Dental Fear Picture Test (CDFP) were used to measure dental fear. The authors found that children with dental fear scored statistically significantly higher on both shyness and negative emotionality. Negative emotionality is defined as the general tendency to become upset easily and intensely.⁴⁷

Poulton, Waldie, Thompson, and Locker found that early onset dental fear was related to conditioning experiences, service use patterns, specific beliefs about health professionals, and stress-reactive personalities. However, conditioning events appear to play a different role in the development of dental anxiety versus dental fear. Dental fear was found to not have a strong relation with personality factors, as dental anxiety does. This shows the difference between the two related ideas.⁴⁸ Ten Berge, Veerkamp, Hoogstraten, and Prins found that parents of children with dental fear attribute their child’s dental fear to numerous factors. These include invasive dental experiences, medical problems, the child’s temperament, negative dentist behavior, and social influences, in that order. An empathetic dentist and parental guidance were suggested as ways to prevent child dental fear.⁴⁹ Alberth, Gal, Nemes, Toviskes, and Math found that there is a significant correlation between the level of fear and anxiety and the number of

untreated teeth, and those with a better dental status and achievement in school have a lower dental fear. The mother's educational level also influences the child's fear significantly.⁵⁰

Despite the studies that support a positive relation between maternal anxiety and a child's negative behavior in the dental chair, several studies show that there is no correlation between maternal anxiety and a child's behavior in the dental chair. Klorman, Ratner, Arata, King, and Sveen found that the mother's estimate of the child's nervousness and situational (state) anxiety is inversely coordinated with the child's cooperativeness. The measures of the mother's anxiety, in terms of state, trait, or specific dental anxiety, have no association with the dentist's assessment of the child's behavior.⁷ Klorman, Michael, Hilpert, and Sveen state that there was no significant relation between the uncooperativeness of the child and his mother's anxiety.⁸

Townend, Dimigen, and Fung studied multiple factors to determine the influence that these factors had on the behavior of the child in the dental chair. They found that the three largest contributors are the number of "traumatic/painful" dental visits that the child has experienced, the dentist's empathy, and maternal anxiety, in that order of importance. The authors found that although there is a direct correlation between maternal anxiety and a child's behavior in the dental chair, the dentist's influence on the child and the child's previous experiences outweigh that of the mother.⁵¹ Majstorovic, Skrinjaric, Glavina, and Szivoczka found that maternal dental anxiety and socio-economic circumstances are less important in a child's dental fear, and that it depends more on early negative medical experience.⁵² Yamada, Tanabe, Sano, and Noda found that there

are many uncooperative patients with low dental fear, and cooperative patients with high dental fear.⁵³

Folayan, Adekoya-Sofowora, Otuyemi, and Ufomata found that there is no statistically significant relation between the anxiety level of the mother or the father and that of their child. However, there is a closer association between the anxiety levels of the mother and the child compared with that between the father and the child.⁹

There are several questionnaires that can be used to evaluate dental anxiety. Schuurs and Hoogstraten assessed five questionnaires and determined that Stouthard's Dental Anxiety Inventory, Weiner's Fear Questionnaire, and Morin's Adolescents' Fear of Dental Treatment Cognitive Inventory are promising, but that more research with them needs to be done. Kleinknecht's Dental Fear Survey is preferred to Corah's Dental Anxiety Scale, but Corah's Dental Anxiety Scale is useful in getting a quick impression of anxiety. They concluded that maybe more than one questionnaire should be used and that non-anxiety questionnaires should be included.⁵⁴

In 1968, Corah and Pantera studied the psychological stress induced from a video simulation of a dental procedure.⁵⁵ This then led to Norman Corah developing a formal scale for the evaluation of dental anxiety in 1969. The questionnaire has four questions relating to the patient's feelings concerning dental treatment. This questionnaire has shown reliability for both internal consistency and stability over time. A score of 13 or over indicates those who are dentally anxious, and those 15 or over as highly anxious.⁵⁶ Later, Corah, Gale, and Illig assessed the Dental Anxiety Scale and found it to be reliable, valid, and useful in measuring dental anxiety, both in the dental office and in research projects.⁵⁷

Humphris, Morrison, and Lindsay confirmed in a study that the reliability and validity of the Modified Dental Anxiety Scale is high and provides norms for phobic and non-phobic patients.⁵⁸ The Corah Dental Anxiety Scale and the Dental Fear Survey are the most widely used dental fear tests.⁵⁹ Kvale, Berg, and Raadal evaluated the ability of the Corah Dental Anxiety Scale to distinguish fearful dental patients from non-fearful patients. They found the reliability to be high, so that 90 percent of the fearful patients and 85 percent of the non-fearful patients were assigned to the appropriate group. They concluded that it is a valid instrument for determining which patients are fearful.⁶⁰

Haugejorden and Klock found that the Corah Dental Anxiety Scale and two different versions of the Modified Corah Dental Anxiety Scale give acceptable sensitivity, specificity, and negative predictive values, but positive predictive values (less than or equal to 0.26) that were too low for prediction on an individual level.⁶¹ Humphris, Freeman and Tuutti performed a study in which they used the Modified Corah Dental Anxiety with the five questions. The patient indicated that they were: not anxious, slightly anxious, fairly anxious, very anxious, or extremely anxious, and these were then ranked with numbers one through five accordingly. A high score denoted a high anxiety response. A total score of 19 or higher is considered to indicate high dental anxiety.⁶²

The Corah Dental Anxiety Questionnaire is probably the best known adult questionnaire designed to assess dental anxiety. The Modified Corah Dental Anxiety questionnaire is the most frequently used dental anxiety questionnaire.⁶³

METHODS AND MATERIALS

Sixty essentially healthy children between the ages of 1.2 and 9.7 years of age were recruited from the Riley Dental Clinic at their first dental visit for this study. Of the 60, one patient was eliminated due to technical difficulties with the video equipment. There were 31 females and 28 males. A consent form approved by the Institutional Review Board (IRB) was signed by the parents prior to dental treatment and video recording of their children. Parents of children coming for a dental visit for the first time were asked to fill out a questionnaire, a modification of Corah's Dental Anxiety Scale. The Modified Corah's Dental Anxiety Scale (Figure 1) reports the results pertaining to anticipation of a dental visit, waiting in the dental office for a turn in the dental chair, waiting in the dental chair for the dentist to begin treatment as he prepares his drill, waiting in the dental chair for the dentist to get out instruments for scraping teeth, and waiting in the dental chair for the dentist to administer a local anesthetic injection. Parents indicated whether they were not anxious, slightly anxious, fairly anxious, very anxious, or extremely anxious. During the exam and visit with the dentist, the children were videotaped. A single investigator treated all of the children to minimize treatment variables. The video recordings of the children were then watched by two separate investigators in order to create an inter-rater reliability. The children were rated according to the Frankl behavior scale throughout different stages of the treatment, the initial exam, the dental prophylaxis, and the radiographs, and then an overall rating of the entire appointment was made. To quantify the behavior, a numerical equivalent of 1, 2, 3, or 4

was assigned to the categories. The Frankl scale is a four- point scale that utilizes the following categories to rank the behavior of the children:

1. (-/-) Definitely Negative: refusal of treatment, overt resistance and hostility, extreme fear, forceful crying, massive withdrawal and isolation. (Numerical equivalent = 1).
2. (-) Slightly Negative: minor negativism or resistance (accessible to treatment techniques), minimal to moderate reserve, fear, nervousness, or crying. (Numerical equivalent = 2).
3. (\pm) Slightly Positive: cautious acceptance to treatment, but with some reluctance, questions, or delaying tactics; moderate willingness to comply with dentist, at times with reservation, but follows directions. (Numerical equivalent = 3).
4. (+/+) Definitely Positive: good rapport with operator, no sign of fear, interest in procedures, and appropriate verbal contact. (Numerical equivalent = 4).

The evaluators were required to attend a training session with videotaped samples to learn how to rate the patients. They were shown five tapes and were asked to rate them prior to the start of the study. These ratings were evaluated to ensure that there was inter-rater reliability, which was present for the study.

Agreement between the evaluators' ratings of the child's behavior was assessed using intra-class correlation coefficients (ICCs) and plots. The ICCs quantify the level of agreement, while the plots show if there are any patterns of disagreements. The multiple behavior ratings were averaged for the remaining analyses. The correlation between the maternal anxiety score and the child's behavior was estimated using a Spearman rank correlation coefficient, adjusted for the child's age. In addition, the desired 95-percent

confidence interval for the correlation coefficient was computed.

The true correlation between the scores is unknown, and previous literature disagrees on the strength of the correlation. Thus, for the sample size justification, we assume the correlation will be around 0.5. With a sample size of 51 children, the 95-percent lower confidence bound for the correlation coefficient is 0.3, if the true correlation is 0.5. With a sample of 59 children, the 95-percent lower confidence bound for the correlation coefficient is 0.2, if the true correlation is 0.4. To achieve this correlation, 59 children were selected to participate in the study.

RESULTS

There were 59 children in the study, of which only 56 (94.9 percent) were brought to the clinic by their mothers. Fathers brought the other three children to the clinic. The children's ages ranged from 1.2 to 9.7 years of age with an average age of $3.5 (\pm 1.7)$. Table I shows the demographic characteristics of the children and the summary statistics of their parents' anxiety scores, and Figure 1 shows a graphic representation of this information. The averages on the first four questions were between slightly and fairly anxious, while the parents were fairly anxious on the final question. Table II shows the summary scores of the evaluator ratings of the children's behavior, and Figure 2 shows a graphic representation of the evaluators' ratings. Because only 31 children had radiographs taken, we looked at the overall scores for all children, for only those with radiographs, and for only those without radiographs. During the exam and prophylaxis, the children behaved better than slightly negative. However, on average during the radiographs, the children were slightly to definitely positive.

Table III shows the intra-class correlation coefficients (ICCs) between the two evaluators of the children's behavior. Again, we looked at all 59 children and the 56 whose mothers brought them to the clinic. The ICCs were above 0.95 during the prophylaxis and exam, but fell to 0.85 for the radiograph scores. The ICCs on the overall scores were above 0.90.

Table IV shows the Spearman correlation coefficients and 95-percent confidence intervals between the parents' anxiety scores and the average overall ratings by the two

evaluators, after adjusting for the age of the children. None was highly associated.

Figure 3 shows a graphic relation between the parental anxiety scores and the evaluator's average behavior scores for each child. The top line shows the total parental anxiety scores, and the bottom two lines show the evaluators' ratings of the child's behavior. From looking at three consecutive points together in the anxiety scores and comparing those with the behavior ratings, it can be observed that there is no correlation between the parental anxiety and the child's behavior. This occurs in a few different locations throughout the graph. Figure 4 shows the breakdown of the patients' ages in years, with the majority of the patients at two years of age.

TABLES AND FIGURES

TABLE I

Demographics and summary statistics of parents' anxiety scores (N(%) or Mean \pm SD)

	All Parents (n = 59)	Mothers Only (n = 56)
Age of Child	3.47 \pm 1.70	3.44 \pm 1.71
Female Children	31 (52.5%)	30 (53.6%)
Anxiety Ques 1	2.47 \pm 1.34	2.43 \pm 1.33
Anxiety Ques 2	2.64 \pm 1.40	2.63 \pm 1.40
Anxiety Ques 3	2.75 \pm 1.42	2.71 \pm 1.42
Anxiety Ques 4	2.59 \pm 1.34	2.61 \pm 1.30
Anxiety Ques 5	3.02 \pm 1.53	3.02 \pm 1.53
Average Anxiety	2.69 \pm 1.15	2.68 \pm 1.13

TABLE II

Summary statistics of evaluator ratings on the MDAS (n=59)

	Evaluator 1	Evaluator 1	Average of 2 Evaluators
Exam	2.73 \pm 1.23	2.83 \pm 1.29	
Prophylaxis	2.76 \pm 1.28	2.71 \pm 1.29	
Radiographs (n = 31)	3.52 \pm 0.72	3.55 \pm 0.77	
Overall	2.73 \pm 1.20	2.76 \pm 1.24	2.75 \pm 1.21
Overall-without Radiographs (n = 28)	1.80 \pm 0.93	1.82 \pm 0.98	1.81 \pm 0.94
Overall-with Radiographs (n = 31)	3.57 \pm 0.68	3.61 \pm 0.72	3.59 \pm 0.69

TABLE III

Intra-class correlation coefficients of evaluator ratings

	All Parents (n=59)	Mothers Only (n=56)
Prophy	0.9639	0.9626
Exam	0.9573	0.9558
Rad*	0.8549	0.8511
Overall	0.9689	0.9677
Overall-without Radiographs **	0.9363	0.9324
Overall-with Radiographs *	0.9279	0.9263

* n = 31 for all parents and n = 29 for mothers only.

** n = 28 for all parents and n = 27 for mothers only.

TABLE IV

Spearman correlation coefficients (SCC) adjusted for children's age, 95-percent confidence intervals (CI) of average evaluators ratings and p-values (Overall, n = 59)

	SCC	95% CI	p-value
Anxiety Question 1	0.0164	-0.2502-0.2808	0.9025
Anxiety Question 2	0.0465	-0.2219-0.3082	0.7291
Anxiety Question 3	0.0697	-0.1995-0.3292	0.6029
Anxiety Question 4	-0.0253	-0.2890-0.2419	0.8503
Anxiety Question 5	0.1339	-0.1365-0.3857	0.3164
Average Anxiety	0.0558	-0.2129-0.3167	0.6772

TABLE V

Spearman correlation coefficients (SCC) adjusted for children's age, 95-percent confidence intervals (CI) of average evaluators ratings and p-values (without radiographs, n = 28)

	SCC	95% CI	p-value
Anxiety Question 1	-0.0413	-0.4246-0.3545	0.8378
Anxiety Question 2	-0.0453	-0.4279-0.3510	0.8224
Anxiety Question 3	-0.0309	-0.4160-0.3636	0.8784
Anxiety Question 4	-0.0731	-0.4504-0.3263	0.7170
Anxiety Question 5	0.0791	-0.3209-0.4552	0.6948
Average Anxiety	-0.0713	-0.4489-0.3279	0.7239

TABLE VI

Spearman correlation coefficient (SCC) adjusted for children's age, 95-percent confidence intervals (CI) of average evaluators Ratings and p-values (with radiographs, n = 31)

	SCC	95% CI	p-value
Anxiety Question 1	0.2033	-0.2802-0.5331	0.2813
Anxiety Question 2	0.2369	-0.1458-0.5579	0.2076
Anxiety Question 3	0.1274	-0.2545-0.4750	0.5022
Anxiety Question 4	-0.0148	-0.3826-0.3571	0.9381
Anxiety Question 5	0.2065	-0.1770-0.5355	0.2737
Average Anxiety	0.2275	-0.1555-0.5511	0.2266

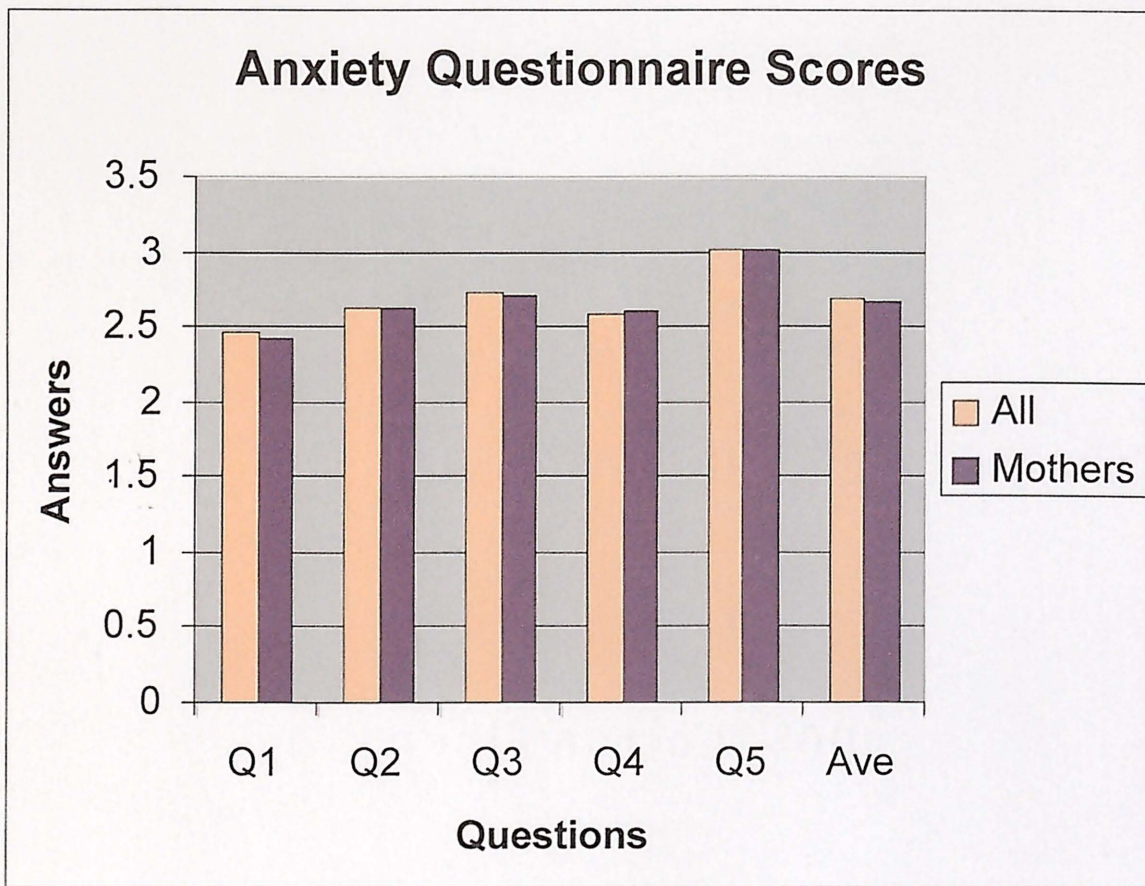


FIGURE 1. Summary statistics of parents' anxiety scores.

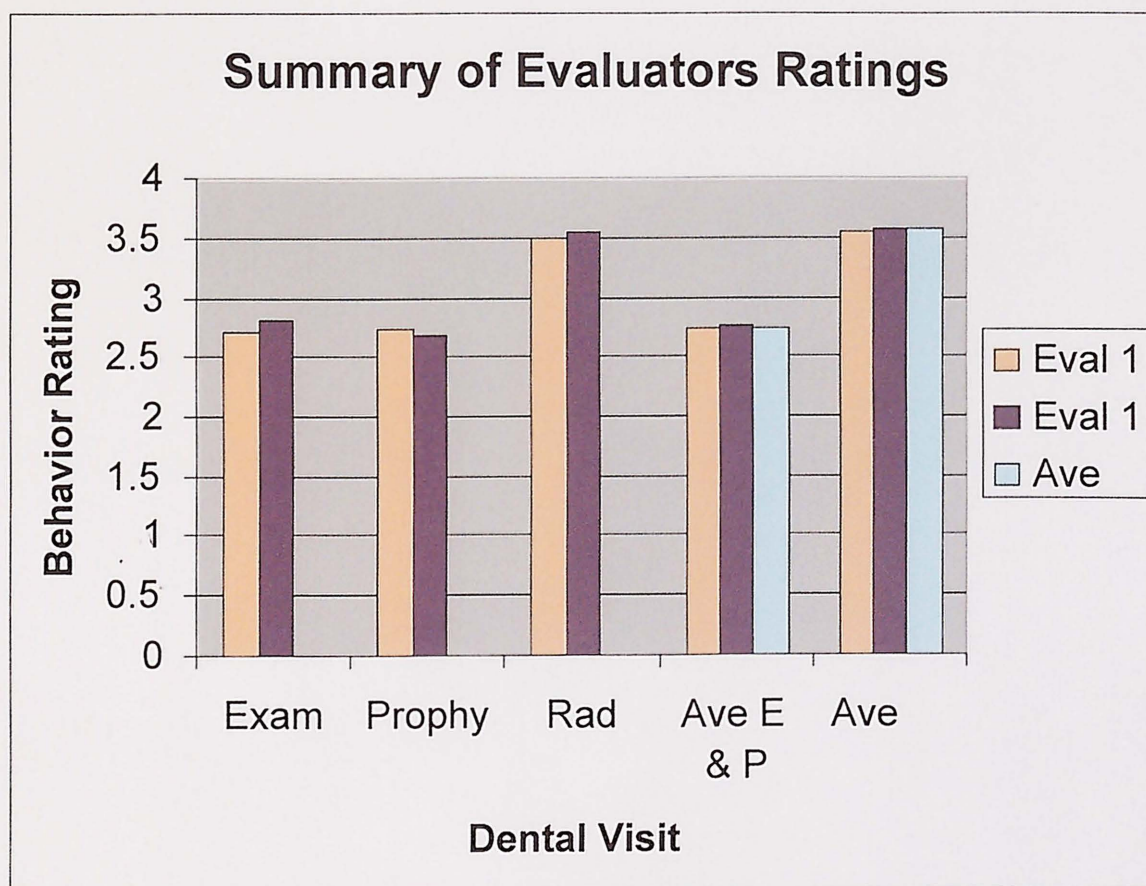


FIGURE 2. Summary statistics of evaluator's ratings.

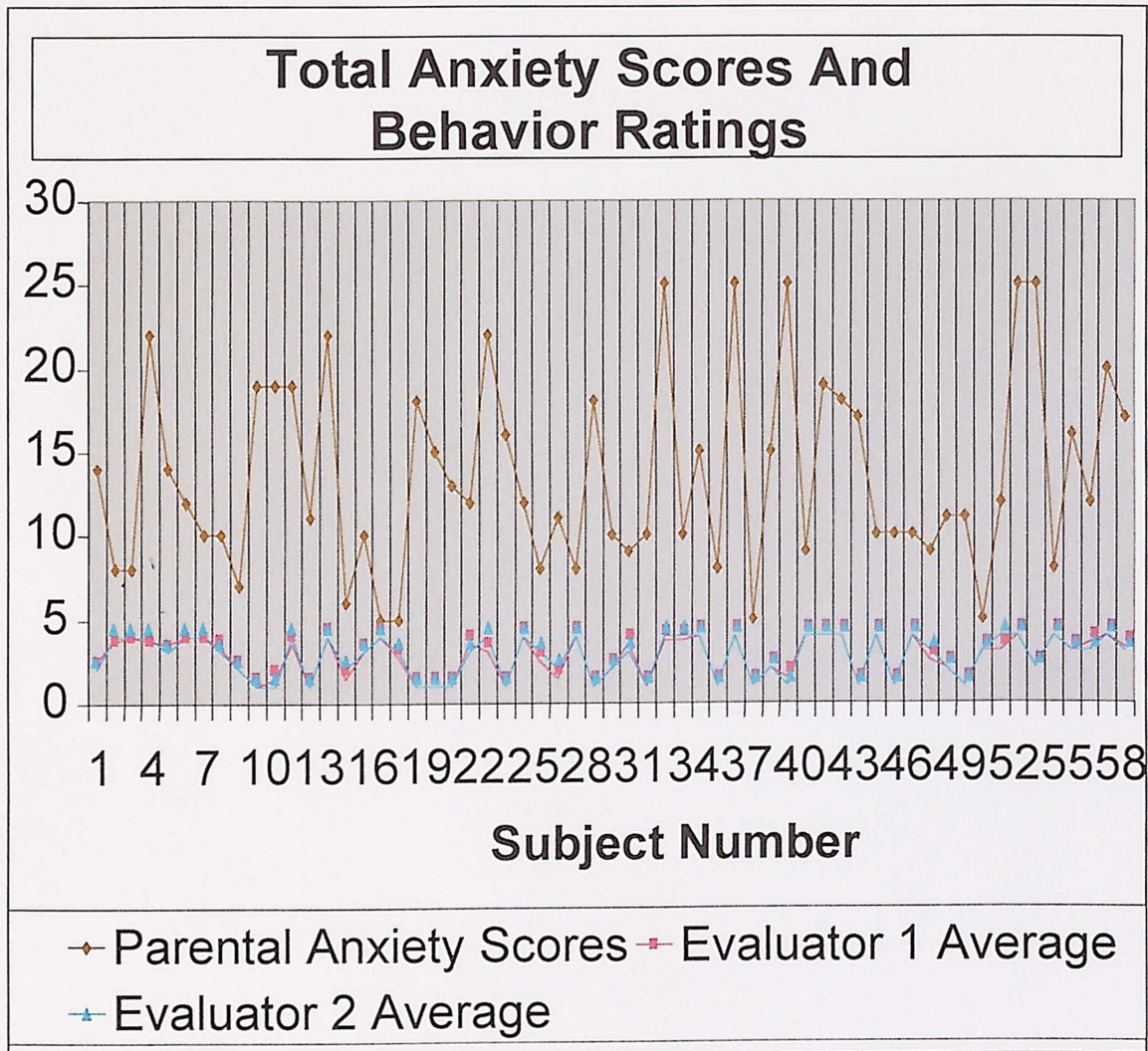


FIGURE 3. Total parental anxiety scores and the evaluators' behavior ratings of the children.

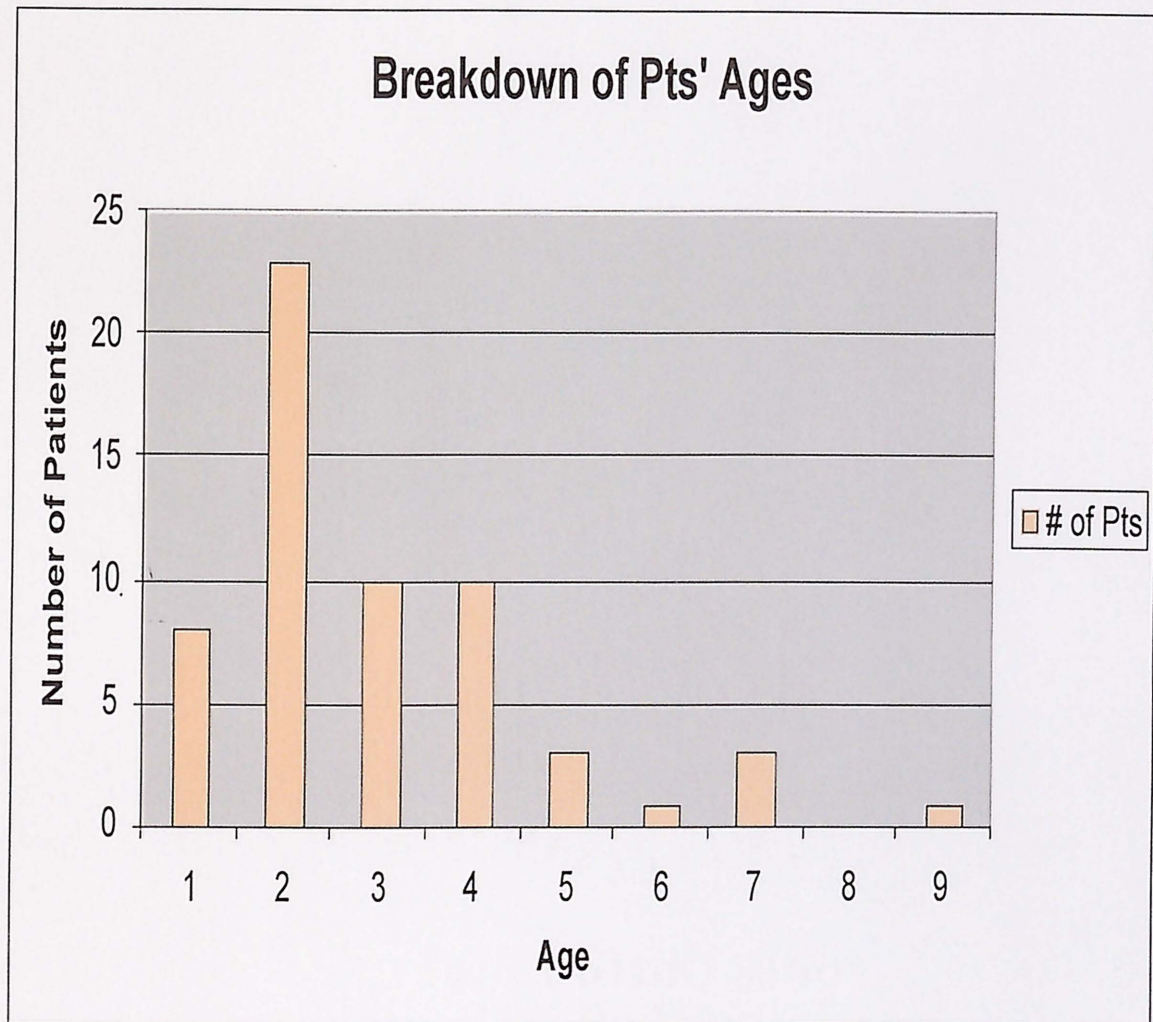


FIGURE 4. Breakdown of patients' ages in years.

DISCUSSION

There has been extensive research concerning maternal anxiety and the child's behavior in the dental office. Some of this research has shown that there is a correlation between the two, while other studies have shown that there is no relation. Trends in the types of research done over the past 30 years have changed, and the amount of research concerning the behavior management techniques in pediatric dentistry has decreased. Therefore, the majority of the research is not current. We must determine if there is any correlation between maternal anxiety and children's behavior in terms of societal changes and changes in childrearing. Pinkham explains how Margaret Mead proposed that American culture went from a society that raised children according to "conventional techniques (postconfigurative) into a transitional stage where modifications of various types and experimental levels were allowed (configurative); and, finally, in certain places for certain people, into parenting strategies that are very contemporary with sometimes day-to-day or even hour-by-hour adjustments to the needs of the child (preconfigurative)."⁶⁴

Numerous causes besides maternal anxiety can influence a child's behavior in the dental chair and need to be considered. In this study, an attempt was made to eliminate as many of these variables as possible. All the children were essentially healthy to minimize a history of previous negative medical experiences. The children were also evaluated at the first dental visit, so that they had no previous dental experience. The children were treated in the same operatories, so that they would have the same

environment. A single operator treated all patients, so that all would be treated in the same manner in a similar clinical environment. For the dental visit, the mothers, or fathers, were allowed in the operatory with their children. The socioeconomic status of the family was not taken into consideration for this study, although 80 percent of the patients in this study could be classified as lower-income because of the patient profile of the Riley Dental Clinic. All patients are treated the same despite their payment method. However, Frankl, Shier, and Fogels determined that socioeconomic status, as well as sex, race, or nursery school attendance, have an influence on the behavior of children when comparing the presence or absence of the parent in the operatory.²⁵ Also, Foloyan, Idehen, and Ufomata administered a short-form Dental subscale of the Child Fear Survey schedule to 81 patients from eight to 13 years of age. They found no significant association between age, socio-economic status, and the level of dental anxiety.¹⁸ However, Arnrup, Berggren, Broberg, Lundin, and Hakeberg found that parents of uncooperative dental patients have significantly lower socio-economic status and a higher level of dental anxiety compared with parents of cooperative dental patients.³¹ Future studies could compare multiple sites and economic status to determine a correlation.

When considering external influences on a child's dental fear, and hence, behavior in the dental chair, we also consider all members of the family, including siblings, cousins, and the other parent that was not present at the dental visit, as well as friends and schoolmates. Most children that participated in the study were brought to the dental clinic by their mothers. However, three were brought by their fathers. When the children were brought in by their fathers, we could not evaluate the anxiety level of the mother due to her absence. Rather than eliminating these patients from the study, it was

decided to include and evaluate the anxiety level of the father to see if there was any correlation between the child's behavior and the father's anxiety level. There was no significant correlation between the father's anxiety and the child's behavior in the dental chair, and there was no difference as to whether the father's or the mother's anxiety level was evaluated and the child's behavior. However, the present study does not have a sufficient number of fathers included to warrant any conclusions. There has been no research concerning the influence of paternal anxiety on a child's behavior during dental treatment. This poses a possibility for future research, because the social structure over the past 30 years has changed. Society has developed to the point where it accepts the stay-at-home father as a possible role in the family unit, and this could have a significant influence on the behavior of the child. The family members present in the household may also have an influence on a child's behavior. For example, is the home a single parent household, are both parents present, or is a combined household with step-parents and siblings present? Perhaps this has some influence on the behavior of the child and his anxiety level. The anxiety level of the parent that is present in the dental office is evaluated and the anxiety level of the other parent that is not present is not taken into consideration. It was not determined in our study whether the parent that was not present would actually have more influence on the child than the one that is present. It was assumed that the parent that took the child to the dental office would have more impact on the child's perception of the dentist and his behavior. If an evaluation could determine which parent would have more influence on the child, and then a study evaluated only that parent's anxiety, perhaps a correlation could be found between that parent's anxiety level and the child's behavior in the dental chair.

Before including these patients in the study, both the study and the purpose of the dental anxiety questionnaire were explained to the mothers. As the dentist was explaining the nature of the research and the purpose, it became obvious to the dentist that some mothers had agreed reluctantly to participate in the study, and that there may have been bias toward the investigator and the research. It is the researcher's opinion that some mothers did not answer the anxiety questions truthfully, which could have affected the results. Upon completion of treatment, it was observed that several parents told the dentist while away from their children that the parents themselves have a great fear of dentists, but that they tried not to allow their children to know or allow the parental fear to have an impact on the children.

There are other factors that could affect the behavior of the children that were not taken into account throughout this project. The children's personality characteristics were not considered in the evaluation. Research has shown that personality may have an influence on the behavior of the children. Also, the childrearing beliefs, culture, and manner in which the children are raised may have an influence on behavior that children display in the dental office.

It is also interesting that behavior during the radiographs, when they were taken in the study, was more positive than the behavior displayed in sessions without the radiographs. At first glance, this could indicate that in general, behavior for radiographs is usually better than the behavior for the rest of the procedures during the dental visit. However, for this to be an accurate comparison, one must only consider the behavior of those patients that had radiographs taken, and then compare their behavior prior to the radiographs to the behavior during the radiographs. Then, it could be determined if

radiographs have a more positive influence on the behavior of children. Maybe this could also be an idea for future research concerning children's behavior in the dental chair.

Further research needs to evaluate a population with a higher socioeconomic status and also evaluate the child-rearing methods that the parents use. A more diverse group of both mothers and fathers could be used rather than only a majority of mothers. Perhaps other situations should be evaluated, such as divorced families, single-parent homes versus two-parent homes, and paternal anxiety. This particular study used an anxiety scale that could produce a quick measure of anxiety, but it is not necessarily the best questionnaire to use. Possibly, future studies should employ several questionnaires. The Modified Corah Dental Anxiety Scale (MCDAS) was considered to be the best choice for this study because of its brevity and the population of parents that were included in the study. Some parents did not have the patience, time, or educational level to answer a more in depth-questionnaire, so that prior to offering a second scale, we must consider the ability of the parent to complete a more exhaustive questionnaire. There was also no pre-appointment information sent to the parents ahead of time. If information about what to expect in the first dental visit with our office had been provided, the behavior of the children would have been influenced, because the parents would have had a better idea of what to expect from the dental visit.

This research was performed similarly to a study by Wright, Alpern, and Leake, in which they included 124 subjects between the ages of three and six years of age that had no previous dental experience. The mothers were asked to complete the Taylor Manifest Anxiety Scale (MAS) questionnaire, and the children's behavior was rated

using the Frankl Scale. Their behavior was rated during the separation procedure, the introduction procedure, the clinical examination, and the radiographic procedure. There was a positive correlation between maternal anxiety and the child's behavior in the dental chair.²³ Another study by Johnson and Baldwin was similar to this, using the MAS and Frankl Scale to determine if there is a correlation between maternal anxiety and the child's behavior in the dental chair for children from three to seven years of age. However, Johnson and Baldwin's study informed the parents ahead of time what to expect from the dental visit. A positive correlation was found between the maternal anxiety and the child behavior in the dental chair.²¹ Both studies are similar to the present study, and they found a correlation between maternal anxiety and the child's behavior in the dental chair. However, both studies occurred 30 years ago, and many variables in society have changed since then.

SUMMARY AND CONCLUSIONS

A great deal of research has focused on many different factors that could cause dental anxiety/fear in children that subsequently influence their behavior in the dental chair. One of these factors is maternal anxiety about her own dental treatment. Through an attempt to minimize the other possible variables that could have an influence on the child's behavior in the dental chair, this study was performed to determine if maternal anxiety is one of these factors. Sixty children were studied to determine that there is no significant relation between maternal anxiety and the child's behavior in the dental chair. This result indicates that maybe other child-influencing factors that could not be controlled in this study could have more influence than a mother on the behavior of the child. Further analysis is required to determine and evaluate all variables that can influence a child's behavior in the dental chair, because a mother may not have as much influence as once believed.

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APPENDIX

APPENDIX I

IUPUI and Clarian Informed Consent Statement

Maternal Anxiety and the Child's Behavior in the Dental Chair

Dear Parents and First Time Dental Patients,

You and your child are invited to participate in a research study to evaluate the relationship between a mother's anxiety about her child's first dental visit and that child's behavior in the dental chair. The purpose of this study is to determine if a mother's anxiety has an influence on a child in the dental office. If you agree to participate, you and your child will be one of sixty mother/child combinations of the Riley Dental Clinic new patient examinations.

If you and your child agree to participate, a dentist of the University Pediatric Dentistry Associates will examine your child's mouth, provide a cleaning and fluoride treatment, and take any necessary pictures of your child's teeth while your child is being videotaped throughout the procedure. These procedures will still be performed (without being videotaped) if you do not wish to participate in the research study. The taping may stop if, at any time, your child becomes upset or if you wish to stop the taping procedures. You and your child will know that the taping is occurring as the tape will be recording the entire time you and your child are in the examination room. The dental appointment should not be prolonged due to participation in the study because only procedures that would routinely be performed for a first dental visit will be done. Participation in this study will require approximately 30 minutes of your time. You will also be asked to complete an anxiety questionnaire that will take only a few minutes to complete. As with all treatment in our dental clinic, infection control procedures (sterile instruments, gloves, masks, etc.) will be used at all times.

The treatment that your child will receive will be the same regardless of whether you agree to participate in the research study, as it is completely voluntary. The child's planned treatment will not change if you do not wish to be part of this. There are no additional benefits or risks involved in the study and you may refuse or discontinue participation at any time.

This research study does not involve any restorative treatment during the first visit and if any is necessary, the child will be given an appointment to return to our clinic for this treatment. While the general results of this study may be published at the end, you and your child's records and information will be strictly confidential and not identified personally. You and your child will not be receiving any compensation for participation in this research study.

If you have any questions, or wish for more information, please feel free to call Dr. Hayley Heckman at (317) 274-3865, or Dr. Brian Sanders at (317) 274-9604, or ask any questions at this time. Thank you very much for your help with this project.

Initials_____

If you are willing to participate, please read and sign this form in the appropriate place. For questions about the study or safety concerns, you can contact Dr. Hayley Heckman or Dr. Brian Sanders at the phone numbers provided above. Please contact the patient representative at Riley Hospital at (317) 274-6637 regarding: 1) any questions you may have regarding the study 2) concerns regarding safety of you and your child and 3) you and your child's rights as a research participant.

Sincerely,

Hayley B. Heckman, D.M.D.
Indiana School of Dentistry
Riley Pediatric Dental Resident
(317) 274-9604

I give my consent for myself and my child to participate in this research study. I may drop out of or be withdrawn due to the dentist's concerns for my oral health, from the study without fear of changing the investigator's interest or the quality of dental care which I may seek or receive for my child in the future from the doctors participating in the study. Upon signing this, myself and my child (if capable) have also verbally agreed to participate in this study.

I acknowledge receipt of a copy of this informed consent statement.

Mother's Signature_____

Date_____

Child's Signature_____

Date_____

Signature of Witness_____

Date_____

APPENDIX II

Subject Number: _____

Date: _____

Dental Anxiety Questionnaire**(Modified Corah Dental Anxiety Questionnaire)**

1. If you had to go to the dentist tomorrow, how would you feel about it?

1	2	3	4	5
not	slightly	fairly	very	extremely
anxious	anxious	anxious	anxious	anxious

2. When you are waiting in the dentist's office for your turn in the chair, how do you feel?

1	2	3	4	5
not	slightly	fairly	very	extremely
anxious	anxious	anxious	anxious	anxious

3. When you are in the dentist's chair waiting while he gets his drill ready to begin working on your teeth, how do you feel?

1	2	3	4	5
not	slightly	fairly	very	extremely
anxious	anxious	anxious	anxious	anxious

4. You are in the dentist's chair to have your teeth cleaned. While you are waiting and the dentist is getting out the instruments which he will use to scrape your teeth around the gums, how do you feel?

1	2	3	4	5
not	slightly	fairly	very	extremely
anxious	anxious	anxious	anxious	anxious

5. When you are sitting in the dental chair waiting for the dentist to start treatment with an injection, how do you feel?

1	2	3	4	5
not	slightly	fairly	very	extremely
anxious	anxious	anxious	anxious	anxious

ABSTRACT

MATERNAL ANXIETY AND THE CHILD'S
BEHAVIOR IN THE DENTAL CHAIR

by

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The literature is varied as to whether there is a positive correlation or if there is no relation between maternal anxiety and a child's behavior at the dentist's office. The purpose of this study was to determine if there is a correlation between maternal anxiety and a child's behavior in the dental chair at the first dental visit. The hypothesis for this research study was that there would be a positive correlation found between maternal

anxiety and a child's behavior in the dental chair. A total of 59 essentially healthy children between the ages of 1.2 and 9.7 years of age with no previous dental treatment were selected for this study. Informed consent was obtained with approval from the Institutional Review Board. All children received an initial dental examination, dental prophylaxis, a fluoride treatment, and radiographs when indicated clinically. The children were videotaped during the dental appointment with consent obtained from the parents. The child's cooperativeness during the dental treatment was measured using the four-point Frankl scale and was evaluated by two separate investigators.²⁵ The mother's anxiety was measured using a modification of Corah's Dental Anxiety Scale.⁵⁶ Fifty-six of these children presented to the dental clinic with their mothers, while the other three presented with their fathers. There were 31 females and 28 males. The correlation between the maternal anxiety score and the child's behavior score was estimated using a Spearman rank correlation coefficient, adjusted for the child's age. In addition, Spearman correlation coefficient shows a 95-percent confidence interval. In this study, there was an attempt to determine if the relationship that exists between a mother and child allows the fears of the mother to be expressed through the behavior of the child. However, this research showed that there is no significant correlation between the dental anxiety level of the mother or father and the behavior of the child at the first dental visit. Ultimately, there was no difference in the results between those that presented with their fathers versus those with their mothers; however, there was not a large enough sample to make this conclusive.

CURRICULUM VITAE

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August 1993 to May 1997	BS Biochemistry, Minor in Music Bucknell University Lewisburg, Pennsylvania
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Professional Organizations

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American Academy of Pediatric Dentistry
American Society of Dentistry for Children
Indiana Dental Association
Indiana Society of Pediatric Dentistry

Awards

Platnik Scholarship Award
Stomatognathic Honor Society
Oral Surgery Honor Society
Ralph E. McDonald Scholar Award